

## THE FOCUS AND INVESTIGATION CHALLENGES FOR INFLUENCE OF ANIMAL AND PLANT PRODUCTS DOWNSTREAM FROM TAILING DAM SASA

V. Mitevka, B. Krstev, A. Krstev, B. Golomeov, M. Golomeova, V. Zajkova, T. Danevski

<sup>1</sup>University "Goce Delchev", Faculty of Natural and Technical Sciences, Shtip, R. of Macedonia

<sup>2</sup>Mine SASA, M. Kamenica, R. of Macedonia

<sup>3</sup>University "Goce Delchev", Faculty of Computer Science, Shtip, R. of Macedonia

**ABSTRACT.** The current activity in the Sasa mine and flotation of useful galena and sphalerite producing metallic lead and zinc for market, are reason for possible troubles from tailing dam-pond and surrounding river for influence of animal and plant products. Specially for milk, potato, tomato, paprika, lentil, carrot and other product very important for human needs. In this paper will be present results of investigations for heavy metal presence in these products. Statistical analysis and other graphical presentation will show the possible pollution and situation of this influence.

**Key words:** investigation, animal, plant, tailing dam, Sasa, Bucim

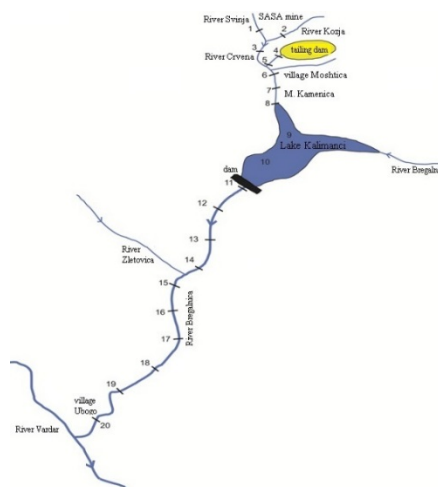
### INTRODUCTION

Flotation tailing dams affect the environment through the soil, the water and the air, and in that way, they affect the plants and animal, and also the people. The most serious problem from the ecological aspect, associated with the storage of flotation tailing, is release of contaminated water into surface and groundwater flows, the more complex is in the surface flows. As a result of the long time releasing of contaminated water, dangerous substances are deposited on the sides of the river - bed and around it, which leads to contamination of the surrounding soil.

Often in practice, due to various objective and subjective factors, uncontrollable situations arise, that lead to increased emission of dangerous substances in the water (which is often used for irrigation) for a short period of time. The reason for that are minor or major problems in the flotation tailing transport system or defects of other ancillary systems of the tailing dam. Especially dangerous is if the flotation tailing flow directly in the rivers. Analyses of water quality are contaminated with heavy metals and according these results can be decided which methods and ways should be undertaken to improve their quality and their protection from further contamination for animal and plant products in this area. In the Sasa mine (Pb-Zn ore), the water from the deposition lake on tailing dam No.3 – phase II (second phase) is released through the overflow collector in river Kamenichka. A small part (filtration and leaching water) are released as drainage water. Part of it is filtered into the groundwater flows. Despite all control measures to improve the water quality of the deposition lake on tailing dam of Sasa mine (clarify with more days staying, return line for water), sometimes is possible releasing of contaminated waters. The quality of the overflow and drainage waters is subject to the control measurements including determination of their physical - mechanical purity (solid residue), toxic chemical elements and pH value. Control measurements are performed every month. Maximum allowable concentrations of heavy metals for water of III category are (mg/l): 0.1 Pb, 1.0 Zn, 0.1 Cu, 0.01 Cd, 1.0 Mn, 1.0 Fe, 0.05 As, 0.1 Cr, 2.0 Co.

The aim of this paper is evaluation of impact from the water quality in the vicinity of the Sasa mine, according to the concentration of heavy metals and to determine adverse impact on mine and tailing dam on the environment (animal and plant products). For this, series of activities were performed:

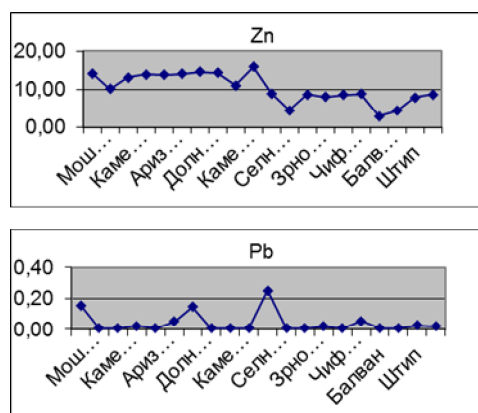
- Preparation of topographic map;
- Twenty samples of water were taken in the area of Sasa mine, along the rivers Bregalnica and Kamenichka, until the river Bregalnica flows into the river Vardar. Specifically, 3 samples over tailing dam system along the confluents of the river Kamenichka, 5 samples along the river Kamenichka (evenly distributed to the inflow into the lake Kalimanci), 2 samples in the lake Kalimanci and 10 samples along the river Bregalnica (from the village Istibanja to the village Ubogo). These samples are marked on a topographic map with markings from 1 to 20 (Figure 1);
- Preparation of animal and plant products samples for analysis and
- Analysis of heavy and toxic metals on collected samples (Pb, Zn, Cd, As, Cr, Fe, Mn, Cu), using the methods of ICP-AES, ICP-MS.



**Fig. 1 Map of measuring points for sampling water and places of investigated animal and plant products**

### RESULTS (Animals and plants products)

The measured values for the content of heavy metals in the animal products (milk) and different plant products were below gy tables or graphics shown. In the same time are shown descriptive statistics for some investigated examples in the region around the Sasa mine and surrounding river.



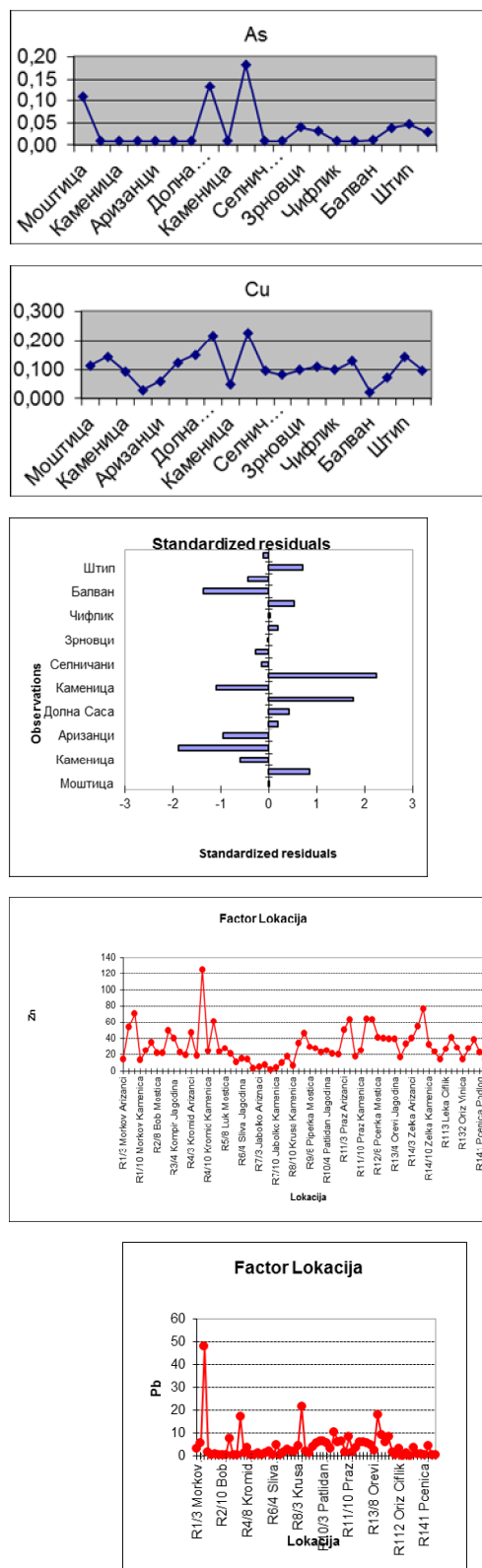


Fig. 2 Descriptive statistics for animal products (milk and plants)

## CONCLUSION

According to the obtained results for the concentration of heavy metals in the animal (milk) and plant products in the surrounding of the river water. It can be concluded that the waters that pass or derived from the vicinity of the mine Sasa have high concentrations of certain heavy metals that are represented in the ore and flotation tailing.

Along the river Kamenicka to the Kalimanci lake, water can be classified even in class II. The fact that water is very polluted to the inflow into the lake Kalimanci, and further along the river Bregalnica continues as cleaner water indicates that as a result of the water staying, heavy metals are deposited. This fact is very important for the appearance of the heavy metals in the animal and plant products around the river. Comparing the obtained results and the concentrations measured in 2004/2005 (the period when Sasa mine was not working), a difference in the concentration of heavy metals (2010) can be confirmed.

In the Sasa mine already introduced some ISO standards, including Standard for environmental management - ISO 14001. With this standard, care to the environment will be performed. To date, problems are solved in a good direction, although there are still risks and possible unexpected cases that may make unnecessary problems to the environment, especially on the plant and animal products in this area.

## REFERENCES

- Bernd G. Lottermoser, Mine Wastes, Characterization, Treatment, Environmental Impacts, second Edition, Springer 2007
- George Tchobanoglous, Franklin L. Burton, H. David Stensel, Wastewater Engineering, Treatment and Reuse, Fourth Edition, McGraw-Hill 2004
- John Brady, Environmental Management in Organizations: The IEMA handbook, Institute of Environmental Management & Assessment, 2005
- Министерство животна средина и просторно планирање на Р. Македонија, Годишен извештај од обработени податоци за квалитетот на животната средина за 2006 година, 2006 [www.mon.gov.mk](http://www.mon.gov.mk)